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AFS-Mr. Ferguson

L-Mr. Metzger (Substance)

U/MSC-Mr. Frechling (substance)

DLF-Mr. Smith (Substance)

AF-Mr. Kenney (Substance)

DAF-Miss Painter (Substance)

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AUG 19 1959

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845J.2614/8-1059

Dear Sam:

It was with a great deal of interest that I read your letter of August 10 regarding the study of your engineers of the reassessment report on the Volta River Project prepared by Henry J. Kaiser Company and their reasons for concluding that the feasibility of the Project has not been clearly established.

Relative to your statement that the Ghanaians must not be given too much encouragement unless the Project is carefully engineered and completely planned in all its aspects, I believe you know that approximately two months ago the Ghanaians informally requested that a World Bank team be sent to Ghana for the purpose of conducting an economic survey which would include an assessment of the Volta River Project. Although the Ghana Government is now considering, in light of talks held last week in Washington with the Bank, whether a formal invitation should be extended, it appears quite likely that an invitation will be forthcoming. In this event, I believe we can assume that the Bank will be quite realistic and that in its talks with the Ghanaians as well as in its final report the points or issues similar to those raised by your engineers will be covered.

I believe it would be helpful to the World Bank if you passed on to them the results of your study to date of the Project.

With best wishes,

Sincerely,

/S/ Douglas

Acting Secretary

Mr. Samuel C. Waugh,
President,
Export-Import Bank of Washington,
Washington 25, D.C.

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AF - Mr. Satterthwaite

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EXPORT-IMPORT BANK OF WASHINGTON
WASHINGTON 25, D. C.

OFFICE OF THE PRESIDENT

CABLE ADDRESS
"EXIMBANK"

RM/R
FILE

August 10, 1959

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Dear Doug:

Further to our letter of June 3, I am sending you herewith copy of a study by our engineers of the reassessment report on the Volta River Project prepared by Henry J. Kaiser Company. You will see that in their opinion the feasibility of the project has not been clearly established.

Since our last letter on the subject, we have had calls from representatives of the aluminum industry who have stated their opinion that large sums of money, particularly government money, should not be invested in Africa for the reduction of bauxite to aluminum. They claim there are sufficient facilities for this in the United States for the foreseeable future. As you know, there are representatives of the aluminum industry who hold a diametrically opposite view. In our studies of the project we have reached several conclusions.

First, it is our belief that the hydroelectric project should not be considered unless there are firm commitments from the aluminum industry, or some other large industrial user, to take a very substantial portion of the power. Officials of the Ghana government, however, desire to go ahead with the hydroelectric development even though they cannot get such a commitment from the aluminum industry.

Second, so far as we can discover, a very large part of the difference between the original estimated $900 million made by an English firm and the present estimate of $339.1 million arrived at by Henry J. Kaiser Company results from the elimination from the English estimate of many ancillary projects such as the cost of resettling the lake area population, health and sanitation works, new town sites, port facilities, etc. Certainly before a judgment can be made as to whether such a project should be financed there should be a full understanding of what the cost of such related works would be and what means could be found to finance them.

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Third, the Kaiser report allocates 330,000 kws for use by the aluminum smelter and leaves 175,000 kws to be made available to the transmission network to supply various cities and new industries. At the present time, total installed capacity in Ghana is 84,000 kws of which 53,000 kws is installed in mining developments and 31,000 kws is available for general utility service and industry. It becomes clear, therefore, that if even this new source of electricity displaces the entire present installed capacity which, by the way, is high cost, there would still remain a huge amount of power to be absorbed by new general and industrial users. To the extent that demand does not develop for this extra power, estimated rates will be incorrect and rates to the aluminum company will have to be revised upward unless the government is willing and able to sell power to the aluminum company at a loss. It is of utmost importance, therefore, that a very careful study be made to ascertain the possibility of developing a demand for the power generated over and above the need of the aluminum industry.

Fourth, since there is considerable difference of opinion as to the need for this aluminum production in the foreseeable future, and since dollars will have to be earned to repay much of the indebtedness, a study should be made to determine our country's requirements for new sources of aluminum over the years to come.

We understand that the Ghana government has engaged the English firm of Cooper Brothers to review the Kaiser report and to recommend rates at which electricity generated can be sold. We believe that such a study will be useful, but we think that Ghana should continue the engineering studies and the exploration necessary for the firming up of the design and cost data and that they should be able to give interested parties assurance that the Ghana government can reacquire the necessary sites on the Volta River. At the same time, they should take a realistic look at the financial requirements of the whole project and its related services; this would include the cost of infra-structural projects to attract new industries, availability of skilled and unskilled labor, and the cost of various social and welfare requirements in the affected area, including re-settlement, housing, hospitals, schools, etc. In short, a careful study should be made to ascertain the ability of the economy of Ghana to absorb a project of this magnitude. We believe the Ghanese Government would then be in a position to seek a firm commitment for utilization of a large block of hydroelectric power by the aluminum industry.

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The Volta River project is a dramatic one which appeals to the imagination and successfully carried through it could result in something of which the whole free world would be proud. However, it could be a horrible flop unless carefully engineered and completely planned in all its aspects before too much encouragement is given the Ghanese.

Sincerely yours,

Samuel C. Waugh
President

The Honorable
C. Douglas Dillon
Under Secretary of State
Department of State
Washington, D. C.

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July 28, 1959

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MEMORANDUM FOR THE FILES

Re: Ghana - Volta River Project

This memorandum will attempt to summarize briefly and comment, after preliminary review, on the Reassessment Report on the Volta River Project prepared by the Henry J. Kaiser Company.

Background

The development of power on the Volta River in Ghana has been the subject of interest and study for over thirty years. In 1950 the Volta River Preparatory Commission was formed by the Gold Coast Government and retained the English firm of Sir [illegible] Halcrow and Partners as consulting engineers. Extensive studies were carried out during 1951-1955 and the Preparatory Commission issued its report in 1956. This report proposed a 720,000 kw hydroelectric plant, aluminum development and apparently considerable development work, such as roads, schools, hospitals, etc. The total cost of the program was estimated at the equivalent of approximately $900 million and it was decided that the program was not economically feasible.

During his visit to the United States in July and August of 1958, Prime Minister Nkrumah felt that there was considerable interest in the Volta River project and it was decided that an independent American engineering firm should be engaged to make an up-to-date reassessment of the basic elements of the project. The contract for this reappraisal was signed with the Henry J. Kaiser Company on August 29, 1958 and was to cover only the Ajena power project, aluminum facilities, necessary railroad connections and power transmission. No review was to be made of related works covered in the Preparatory Commission Report, such as lake area population resettlement, health and sanitation programs, new town sites, ports, etc. On September 15, 1958 the scope of the work was enlarged to include examination of additional hydro development, possible related irrigation, and additional bauxite deposits. A survey team visited Ghana in September and October, 1958, and the Kaiser Reassessment Report was issued in February 1959, recommending an ultimate 1,100,000 kw hydroelectric development and a 220,000 LT/yr. aluminum smelter at a combined estimated cost of $600 million.

The Kaiser representatives has stated that in order to prepare a true picture of the development program the project should be separated between the major items of the project, such as the hydroelectric development and aluminum smelter, and the social services, and the representatives of Ghana agreed. This has a bearing on the Kaiser Report establishing a cost of $600 million, or $300 million less than the Preparatory Commission Report.

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It had been believed that publication of the report would engender great interest on the part of the aluminum companies. The reassessment survey received wide publicity and was written up in many magazines, such as Time, Engineering News Record, U. S. News & World Report, and Electrical World, during May and June 1959. The rush of the aluminum companies, however, did not occur, and there appears to have been considerable hedging on both sides regarding definite electric rates for the aluminum companies, since low electric rates are essential for aluminum refining. For assistance in this connection the Government of Ghana has recently contracted with the English firm of Cooper Brothers to review the report and recommend rates.

The Government of Ghana has expressed its desire to go ahead with the Volta River hydroelectric development even without development of an aluminum industry. It has made between $2½ and $3 million available for further studies, construction of access roads, etc. It has expressed its willingness to advance $53 million for the initial hydroelectric development estimated by Kaiser to cost $180 million and would like to secure assistance in financing the remaining $127 million. For assistance in finalizing its plans and arranging financing, the Government of Ghana has recently retained the services of Mr. George Wood, formerly of the First Boston Corporation.

Kaiser Reassessment Report

The Kaiser Report recommends a four-stage development for Ghana that would provide 1,095,000 kw of hydroelectric capacity on the Volta River and an aluminum smelter with a capacity of 320,000 long tons per year. To effectively distribute this power, a 165 kv transmission network is planned, and some modifications to the railroad system are necessary to transport bauxite. The estimated cost of this program is $599.5 million.

The first-stage development is estimated to cost $339.1 million, of which $180.3 million will be expended on the electric development, with a minor amount for transportation, and $158.8 million will be expended on the aluminum smelter. The hydroelectric development will consist of the Kosombo dam with a powerhouse containing four 128,000 kw units, or a total of 512,000 kw, and a 550-mile network of 165 kv transmission lines and primary substations. No subtransmission or distribution lines are included. The aluminum smelter will have an initial capacity of 120,000 long tons per year.

Of the initial 512,000 kw installation, 330,000 kw would be required for the aluminum smelter and 175,000 kw would be made available to the transmission network to supply various cities and new industries. At the present time, Ghana has a total installed capacity of approximately 84,000 kw, of which 53,000 kw is installed in mining developments and

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31,000 kw is available for general utility service. The largest utility system is in Accra, which has 13,000 kw at the present. Approximately 1½ years would be required for design work in connection with the project and an additional 4 years for construction, so that the first stage could be in operation the latter part of 1968.

Stages 2 and 3 would be carried out during the 1965-1970 period at an additional cost of $184.5 million. Stage 2 contemplates the addition of two 128,000 kw units at Kosombo which will bring it to the ultimate capacity of 768,000 kw. Also, the Kpong hydroelectric development will be constructed a short distance below Kosombo with a capacity of 140,000 kw. These power additions represent an investment of $69.2 million and raise the system capacity to 908,000 kw. Stage 3 represents an additional 100,000 LT/yr. increase in the capacity of the aluminum smelter at a cost of $115.3 million, raising the smelter capacity to 220,000 LT/yr.

Stage 4 consists of construction of the 190,000 kw Sui hydroelectric development a considerable distance above Kosombo and the construction of additional transmission lines at an estimated cost of $75.9 million. This stage will be carried out after 1970 and phased with the load growth. It is estimated, however, that it will be required by 1973.

The report is of a preliminary nature to establish the magnitude of the work and the funds required, and states "much field and office work remains to be done in procuring and testing material samples, foundation exploration, and in refinements of designs before final engineering design and cost estimates can be made and bidding documents prepared."

Comments

A review of the Kaiser Reassessment Report indicates that there is much work to be done and many matters to be clarified before Ghana can proceed with the Volta River project. Not the least of these is an awareness of the large amounts which will have to be expended in addition to the cost of the actual project, and of the necessity of firm commitments by large users of electric energy.

To indicate the magnitude of the proposed Kosombo dam undertaking, a few figures may be helpful. This dam will back water up for a distance in the neighborhood of 235 miles, forming a tremendous lake. Storage capacity at the normal maximum controlled water level will be 120 million acre feet, or four times the size of Lake Meade behind Hoover Dam. Maximum capacity may be closer to five times that of Lake Meade. A development of this size cannot be carried out in small increments.

The Preparatory Commission Report proposed a dam at the Ajena site which would develop 720,000 kw at a cost of approximately $208 million based on 1959 costs. The Reassessment Report recommends moving the dam

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site downstream approximately one mile to Kosombo, where it is estimated that a power development of 768,000 kw can be constructed at a cost of approximately $156 million. This change represents potential savings of $60 million and Kaiser states that development of the Kosombo site is feasible in view of increased knowledge and experience on the diversion of large rivers in narrow canyons and the development of huge earth-moving equipment which is currently available in the U. S. market. In carrying out a project of this magnitude, however, large resettlement costs, health and sanitation programs, road construction, etc., will have to be carried out by the Government, and it will undoubtedly require large expenditures not included in the Kaiser Report. Although the Bank has not received a copy of the Preparatory Commission Report, it is believed that such costs account for a considerable amount of the difference between the total estimated costs of the two reports.

Stages 2, 3 and 4 of the proposed development will be phased as conditions require; therefore these comments will be devoted to Stage 1 of the program consisting of a 512,000 kw development at Kosombo, construction of a 165 kv network, and a 120,000 LT/yr. aluminum smelter at an estimated cost of $339.1 million. The Kaiser Report states that all of the potential hydro sites on the lower Volta River are controlled by British and Canadian aluminum interests. An agreement with these companies must, therefore, be worked out before the work could be initiated. Considerable additional engineering work is required to provide firm plans and cost estimates, and call for bids.

The initial development allocates 330,000 kw for the use of the aluminum smelter or some other large user such as the chemical industry. To date no such large consumer has come forward. The aluminum industry is exploring the west coast of Africa where there are a large number of bauxite deposits and large potential hydro developments. These developments are in Portuguese Guinea, French Guinea, Ghana, the Cameroons, French Equatorial Africa, the Belgian Congo, and Angola. Whereas the development of some of these projects is well advanced, there seems to be an inclination on the part of the aluminum companies to proceed slowly at this time.

After allowing for the requirements of the aluminum smelter, there remains 175,000 kw which will be made available to the network to supply cities and towns having limited service, if any, at the present time, and for the establishment of new industries. Contrasted with this 175,000 kw, the current capacity of Ghana is 84,000 kw, of which 53,000 kw is reportedly used in mining operations largely for pumping. There has reportedly been practically no increase in this mine load in the past ten years. The remaining 31,000 kw is consumed by relatively small utility systems, of which the largest is reported to be Accra, with 13,000 kw, ranging down to 25 kw systems. All of the existing capacity is operated on imported fuel and is quite expensive. It is apparent,

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therefore, that 175,000 kw from Kosombo could assume all of the existing load and still permit more than a 100% increase. The Embassy of Ghana states that it has compiled a list of a large number of industries that would be developed in Ghana if adequate power was available. It would appear, however, that the development of such industries would place an additional financial burden on the economy of Ghana. Also, to develop these loads while Kosombo is being constructed, the Kaiser Report suggests that interim diesel and steam capacity be installed and shut down when hydro power is available. The cost of these facilities and the economy of the operation have not been discussed, however.

The Kaiser Report makes no provision for subtransmission and distribution lines necessary to distribute energy below the 165 kv level. Since such lines would be essential and would have to be constructed by the consumers or municipalities, it would necessitate an additional drain on the economy of Ghana.

The Government of Ghana would like to develop electrical facilities, and have the aluminum industry provide the entire requirements, estimated at $150.0 million, for the aluminum smelter. It is also indicated that it would like to proceed with the hydroelectric development even if the aluminum industry is not willing to proceed at this time. Such a procedure would result in a large unused block of power and an uneconomical project.

Conclusion

The feasibility of the project has not been clearly established. Before Ghana can proceed with the Volta River development, it should, in the writers' opinion:

(1) Continue the engineering studies and exploration necessary for the firming up of the design and cost data and making the necessary arrangements to acquire the sites;

(2) Take a realistic look at the financial requirements of the whole project and its related service; this would include the demands of new industries, the requirements in addition to those in the Kaiser Report, and the various social and welfare requirements in the affected area;

(3) Prepare a study of ability of the economy of Ghana to absorb a project of this magnitude; and

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(h) Secure firm commitments for utilization of large blocks of hydroelectric power from the aluminum industry, chemical industry, or other large users of electric power, before proceeding with the power development, since economic justification requires high and full energy consumption.

W. K. Greene

Frank Kimball

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